

PATENT ABSTRACTS OF JAPAN

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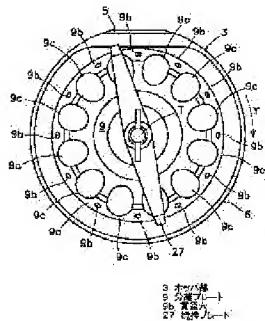
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(21)Application number : 2001-198244 (71)Applicant : NITTO SEIKO CO LTD

(22) Date of filing : 29.06.2001 (72) Inventor : MURAKADO HIROSHI
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(54) SEPARATION AND SUPPLY DEVICE FOR HEADED BAR



(57) Abstract:

PROBLEM TO BE SOLVED: To provide a separation and supply device for a headed bar capable of accurately detecting a remaining amount of the headed bar.

SOLUTION: This device is provided with a hopper part 3 capable of storing plural headed bars, a separation plate 9 rotatably disposed on a bottom part of the hopper part 3 so as to be inclined in a predetermined angle from a level and having plural through holes 9b arranged in equal intervals at an outer peripheral

part so that the headed bar can be fitted in, and an air suction part for sucking air from the through hole 9b of the separation plate 9. A stirring plate 27 is fitted on the separation plate 9 so as to integrally rotate with the separation plate 9. Thus, the headed bar positioned in a boundary part of the hopper part 3 and the separation plate 9 is stirred even when the remaining amount gets less, and the remaining amount can be accurately detected by a photoelectric sensor, etc.

LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] The separation plate with which the hopper area which can store many bars with the head, and the pars basilaris ossis occipitalis of this hopper area were made to carry out predetermined include-angle dip from a horizontal, and two or more division-into-equal-parts arrangement of the through hole to which it is prepared free [a revolution] and a bar with the head can fit into a periphery part was carried out, The separation feeder of the bar with the head characterized by preparing the churning member which can agitate the bar with the head which is the separation feeder of the bar with the head equipped with the air attraction section which attracts air from the through hole of this separation plate, and is located in the boundary parts of a hopper area and a separation plate.

[Claim 2] The separation feeder of the bar with the head according to claim 1 characterized by having a residue detection means by which the residue of the bar with the head of hopper circles is detectable.

[Claim 3] A residue detection means moves to the location of the arbitration of the bar upper part with the head stored by the hopper area, and is that positioning is possible and a separation feeder of a bar with the head according to claim 2 characterized by being constituted so that the distance which detects a bar with the head can be set as arbitration.

[Claim 4] A residue detection means is the separation feeder of the bar with the head according to claim 2 or 3 characterized by consisting of stationary locations which can detect a bar with the head possible [deportation].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the separation feeder of the bar with the head to which the air feed using a feed hose carries out separation supply of the bars with the head, such as a difficult minute screw thread.

[0002]

[Description of the Prior Art] When supplying bars with the head, such as a screw thread, to work devices, such as an automatic thread-fastening machine, conventionally, the method which feeds with the screw thread by which connected the feeder and the work device with the feed hose, and separation supply was carried out with the feeder using this feed hose with compression air has been adopted. About bars with the minute head, such as a minute screw thread used for precision mechanical equipments, such as the leg chief's short bar with short **** and short pocket device, and a camera, to the diameter of a head, it is reversed within a feed hose in many cases, and since air feed is very difficult, the bar separation feeder with the head (only henceforth a separation feeder) indicated by JP,5-58433,A corresponding to this has come [however,] to be offered.

[0003] The separation feeder shown in said JP,5-58433,A The separation plate with which predetermined include-angle dip of many bars with the head was carried out from the horizontal into the hopper which can be stored, and this hopper, and two or more division-into-equal-parts arrangement of the through hole to which it is prepared free [a revolution] and a bar with the head can fit into the periphery section was carried out, It has the air attraction section which attracts air from the through hole of this separation plate, and attracts a bar with the head to a through hole, and a revolution driving source slack pulse motor for carrying out the intermittent revolution of said separation plate the whole pitch of said through hole. In this separation feeder, in response to actuation of a pulse motor, a separation plate carries out an intermittent revolution, and, thereby, a through hole rotates and halts in a predetermined ejection location one by one. If it is detected that the sensor which detects whether the screw thread is held is formed in the ejection location at the through hole, and a screw thread is in a through hole by this sensor, a screw thread will be taken out from the through hole which an automatic thread-fastening machine etc. operates and is in an ejection location.

[0004]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional separation feeder etc., the more the surface of revolution of a separation plate is close to the level surface, the more the screw thread stored by the hopper with the revolution of a separation plate will be spread on a separation plate. For this reason, as for a separation plate, it is desirable to arrange so that surface of revolution may approach a vertical plane as much as possible. If a separation plate is made to incline when this is applied to the separation feeder of JP,5-58433,A, according to this, the dip of a hopper will become loose. Consequently, if the storage of the bar with the head of a hopper decreases, as shown in drawing 7 , in the relation whose bar 101 with the head which hit the separation plate 100 pushes other bars 101 with the head, the bar 101 with the head will move to the opening 103 side of a hopper 102, and will be

spread in the inner skin of a hopper 102. Therefore, although the bar 101 with the head had decreased extremely when the sensor (not shown) performed residue detection of the bar 101 with the head in a hopper 102, a sensor continued detecting the bar 101 with the head, and problems -- a makeup command is not emitted -- had occurred.

[0005]

[Means for Solving the Problem] Creation of this invention is carried out in view of the above-mentioned technical problem. The hopper area which can store many bars with the head, The separation plate with which the pars basilaris ossis occipitalis of this hopper area was made to carry out predetermined include-angle dip from a horizontal, and two or more division-into-equal-parts arrangement of the through hole to which it is prepared free [a revolution] and a bar with the head can fit into a periphery part was carried out, It is the separation feeder of the bar with the head equipped with the air attraction section which attracts air from the through hole of this separation plate, and is characterized by preparing the churning member which can agitate the bar with the head located in the boundary parts of a hopper area and a separation plate.

[0006] In addition, in the above-mentioned configuration, it is desirable to have a residue detection means by which the residue of the bar with the head of hopper circles is detectable, and although it is constituted in this case so that a residue detection means may move to the location of the arbitration of the bar upper part with the head stored by the hopper area and positioning being possible and the distance which detects a bar with the head can be set as arbitration, it is more desirable. Moreover, as for said residue detection means, it is desirable to consist of stationary locations which can detect a bar with the head possible [deportation].

[0007]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on drawing 1 thru/or drawing 6 . In drawing 1 thru/or drawing 6 , 1 is the separation feeder (henceforth the separation feeder 1) of a bar with

the head, and is equipped with many hopper areas 3 which can be stored for the minute screw thread 2 whose air feed is an example of a difficult bar with the head. This hopper area 3 consists of the plinth section 5 attached in the base 4, and the bucket section 6 of the shape of a cylinder attached in this plinth section 5 by carrying out predetermined include-angle dip. The inside of the bucket section 6 is made easy to have formed the up opening end face of this bucket section 6 so that it may be set to level surface 6a, to enlarge area of opening by this, and to be easy to throw in a screw thread, and to check by looking.

[0008] Bracket 4a is arranged ahead of said bucket section 6, and the sensor mounting plate 22 which consisted of hinge structures rockable is attached in this bracket 4a. A lock plate 23 ****s in the point of this sensor mounting plate 22, it ****s to it by 24, the stop is carried out to it, and the slide shafts 26 and 26 to which the photoelectrical sensor 25 which is an example of a residue detection means was fixed with this lock plate 23 are pinched. The photoelectrical sensor 25 supported by these slide shafts 26 and 26 is constituted possible [detection of the amount of the screw thread 2 stored in the bucket section 6], and it is constituted so that that detection distance, i.e., sensibility, can be set as arbitration.

[0009] Moreover, the main shaft 8 supported by bearing 7 free [a revolution] has inserted in the plinth section 5 of said hopper area 3, and it connects with the end of this main shaft 8 so that the separation plate 9 arranged in the location equivalent to the side of the top face of the plinth section 5, i.e., the pars basilaris ossis occipitalis of a hopper area 3, may rotate to one. Between this separation plate 9 and the plinth section 5, the ring plate 10 made of resin fixed to the plinth section 5 can intervene, and the confidentiality of the below-mentioned air attraction can be raised now to it. Moreover, without interrupting after-mentioned through hole 9b, it extends in the diameter direction of the separation plate 9, and the churning plate 27 which is an example of a churning member is attached in the separation plate 9. This churning plate 27 has constituted the configuration along the front face of the separation plate 9, places the front face of the

separation plate 9, and a predetermined clearance, and it is attached so that it may extend to near the boundary of the separation plate 9 and the bucket section 6. These separation plate 9 and the churning plate 27 fasten a twist in the butterfly bolt T, are used as the main shaft 8, and the separation plate 9 and the churning plate 27 are removed simply, and they can exchange them.

[0010] Said separation plate 9 has constituted the disc configuration in which chamfer 9a was given to the periphery part. Into the periphery part Through hole 9b which is prolonged in the direction which goes direct to said chamfer 9a, and penetrates the separation plate 9, and crevice 9c for churning (only henceforth crevice 9c) are plurality and a predetermined pitch by turns, and division-into-equal-parts arrangement is carried out at the circumference of the center of rotation of the separation plate 9, i.e., the circumference of the axial center of said main shaft 8. each through hole 9b ... is made into the path into which a head cannot advance [that the leg (thread part) of a screw thread can be inserted in, and], and when it moves to the highest location with a revolution of the separation plate 9, it is suitable in the direction of a vertical. That is, the include angle of chamfer 9a is set up such. In this separation feeder 1, the highest location of this separation plate 9 is set as the ejection location of a screw thread.

[0011] Attraction hole 5a which can connect the attraction hose (not shown) prolonged from an air aspirator (not shown) is formed in the part equivalent to the lower part of the separation plate 9 in said plinth section 5, and free passage hole 10a is formed in said ring plate 10 so that this attraction hole 5a and predetermined through hole 9b of the separation plate 9 may be made to open for free passage. predetermined through hole 9b which this free passage hole 10a is constituted by the dip center line L2 of which predetermined include-angle theta dip was done in the hand of cut of the separation plate 9 shown by the arrow head Y to the up Shimonaka core wire L1 of a separation plate as shown in drawing 4 at the radii configuration symmetrical with a line, and is open for free passage to this free passage hole 10a -- it is constituted so that air attraction may

be performed from ... That is, in this separation feeder 1, the air attraction section of a publication is formed in the claim by said attraction hole 5a, free passage hole 10a, the attraction hose, the air aspirator, etc.

[0012] Moreover, attraction hole 5b to which the attraction hose 11 other than the above-mentioned attraction hose prolonged from an air aspirator (not shown) was connected is formed in the part equivalent to the screw-thread ejection location (high end) of the separation plate 9 in the plinth section 5, and free passage hole 10b which makes through hole 9b of an ejection location and attraction hole 5b open for free passage is formed in said ring plate 10. Furthermore, the vacuum switch 12 is formed on the attraction hose 11 connected to attraction hole 5b, and the pressure variation within the air attraction path of resulting [from through hole 9b of the separation plate 9] in a vacuum switch 12 via free passage hole 10b, attraction hole 5b, and the attraction hose 11 is detected, and it is constituted so that the air insertion condition here can be checked.

[0013] On the other hand, it is attached in the other end of said main shaft 8 so that the revolution transfer gear 13 and the positioning cam 14 may rotate to one, and the other end of a main shaft 8 is supported free [a revolution] by bracket 4b attached in the base 4 lower part.

[0014] As shown in drawing 5 , said revolution transfer gear 13 is the gearing with which the gear tooth of a predetermined number was formed in the periphery section, and it is constituted by this revolution transfer gear 13 so that the deduction gear 15 may carry out intermittent engagement. moreover, said positioning cam 14 -- the periphery section of a disk -- circular notching 14a of a predetermined radius -- it is the cam member of the sprocket configuration which formed two or more ... successively, and it is constituted by this positioning cam 14 so that the deduction cam 16 may be engaged intermittently.

[0015] It is fixed to the driving shaft 17 which was prolonged in a main shaft 8 and parallel and has been arranged free [a revolution], and the aforementioned deduction gear 15 and the deduction cam 16 are constituted so that it may rotate

to one with a revolution of this driving shaft 17. The deduction gear 15 is the gearing of a special configuration with which tooth part 15a in which the gear tooth of said revolution transfer gear 13 and engagement are possible was formed only in the predetermined range of the periphery section, and parts for the periphery other than tooth part 15a are ****(ed) so that it may not interfere in the revolution transfer gear 13 (refer to drawing 5). It rotates, only while rotating one time and this deduction gear 15 meshes with tooth part 15a of the deduction gear 15, and in response, the revolution transfer gear 13 carries out the intermittent revolution of said separation plate 9 by one pitch of through hole 9b. That is, the formation range of tooth part 15a of the deduction gear 15 is designed according to the pitch of through hole 9b of the separation plate 9. In addition, the installation location is adjusted so that the deduction gear 15 may have engagement relation with the revolution transfer gear 13 to the timing which through hole 9b of the separation plate 9 stops in an ejection location one by one for every intermittent revolution.

[0016] Moreover, the aforementioned deduction cam 16 has selectively engagement periphery section 16a of the same radius as circular notching 14a of said positioning cam 14, and parts other than this engagement periphery section 16a are constituted by the path which does not interfere in said positioning cam 14 (refer to drawing 5). When the aforementioned deduction gear 15 begins to mesh with the revolution transfer gear 13, engagement periphery section 16a separates from circular notching 14a of the positioning cam 14, and when engagement with the deduction gear 15 and the revolution transfer gear 13 is solved, as for this deduction cam 16, physical relationship with deduction gear 15 grade is adjusted so that engagement periphery section 16a may be engaged along with circular notching 14a.

[0017] Said driving shaft 17 is connected with output-shaft 18a of the synchronous motor 18 (only henceforth a motor 18) attached in bracket 4b through the transfer gears 19a and 19b, and it is constituted so that it may rotate in response to actuation of the motor 18 concerned. Moreover, the dog 20 which

prepared one height 20a which projects in the hoop direction of a driving shaft 17 is attached in the driving shaft 17, and the sensor 21 is formed in said base 4 so that height 20a of this dog 20 can be detected. When the separation plate 9 finishes carrying out the intermittent revolution of this sensor 21 and dog 20 according to an operation with the aforementioned deduction gear 15 and the revolution transfer gear 13, both installation locations are adjusted so that a sensor 21 may detect and turn on height 20a of a dog 20.

[0018] In the separation feeder which changes with the above-mentioned structure, if a motor 18 drives, a driving shaft 17 will rotate and the deduction gear 15, the deduction cam 16, and a dog 20 will rotate to one. A revolution is intermittently transmitted to the revolution transfer gear 13 with the revolution of the deduction gear 15, and, thereby, the separation plate 9 carries out an intermittent revolution in the direction of arrow-head Y to a hopper area 3. Since engagement periphery section 16a of the deduction cam 16 engages with circular notching 14a of the positioning cam 14 at this time when engagement of the revolution transfer gear 13 and the deduction gear 15 is solved (at the event of the separation plate 9 and main shaft 8 grade stopping), the revolution transfer gear 13, a main shaft 8, and the separation plate 9 can be positioned to accuracy on that spot. That is, when engagement with the revolution transfer gear 13 and the deduction gear 15 is solved, it prevents the revolution transfer gear 13, a main shaft 8, and separation plate 9 grade becoming a revolution free-lancer, and it bites at the time of re-engagement of the deduction gear 15 by location gap of the revolution transfer gear 13 and the revolution transfer gear 13, and a gap of the intermittent halt location of the separation plate 9 etc. can be prevented. Moreover, since the revolution load by the reduction gear ratio of a motor proper acts in addition to the above-mentioned operation also when equipment is turned off, a separation plate rotates freely and an intermittent halt location does not shift. thus, an intermittent revolution of the separation plate 9 -- the location deduction precision to kick is always maintained by high degree of accuracy.

[0019] In the condition that the separation plate 9 is carrying out the intermittent revolution, if attraction of air is started by actuation of an air aspirator from attraction hole 5a, attraction maintenance will be carried out and the screw thread 2 stored by the hopper area 3 will be transported to an ejection location at through hole 9b of the separation plate 9. this time -- the screw thread 2 in a hopper area 3 -- since ... is agitated by crevice 9c of the separation plate 9, the probability by which attraction maintenance is carried out to through hole 9b becomes very high. and crevice 9c -- the time of churning according to this since ... changes on a curved surface -- ****ing -- 2 ... is not damaged Moreover, a screw thread 2 is the screw thread 2 stored by the bucket section 6 since it was periodically agitated also with the churning plate 27... A meeting is leveled, and the residue detection by the sensor can be closed if . Since the churning plate 27 is prolonged to near the boundary part of the separation plate 9 and the bucket section 6, a churning operation of this churning plate 27 is continued even if the screw thread 2 in the bucket section 6 decreases. Thus, this can be broken down, even if it should prevent that a screw thread 2 is piled up along with the wall surface of the bucket section 6 and it should be piled up by the screw thread 2 of the boundary part of the separation plate 9 and the bucket section 6 continuing being agitated. Therefore, residue detection of the screw thread by the photoelectrical sensor 25 can be performed to accuracy.

[0020] moreover, an intermittent revolution of the separation plate 9 -- following -- the screw thread 2 in a hopper area 3 ... friction with the separation plate 9, and crevice 9c -- it inclines toward the hand of cut (the direction of arrow-head Y) of the separation plate 9 according to the churning operation by ... etc., and is distributed. since [on the other hand,] free passage hole 10a is arranged to the dip center line L2 at the symmetrical form, i.e., the form offset and prolonged in the hand of cut of the separation plate 9, -- the screw thread 2 in a hopper area 3 -- even if ... inclines toward the hand of cut of the separation plate 9 -- these screw threads 2 -- attraction maintenance of ... can be efficiently carried out to through hole 9b.

[0021] On the other hand, in the ejection location equivalent to the highest location of the separation plate 9, attraction of air is performed from attraction hole 5b, when the screw thread is held at through hole 9b which was open for free passage here, the pressure within the path from through hole 5b to a vacuum switch 12 via free passage hole 10b, attraction hole 5b, and the attraction hose 11 rises, and, thereby, a vacuum switch 12 turns on. since a sensor 21 is turned on when through hole 9b arrives at an ejection location simultaneously -- this sensor 21 -- ON -- becoming -- **** -- in addition -- and when the vacuum switch 12 is turned on, it ****s to through hole 9b in an ejection location, it considers that 2 is held, and a motor 18 stops.

[0022] Then, if the screw thread 2 of through hole 9b in an ejection location is taken out by operation of a thread-fastening machine etc., since a vacuum switch 12 will become off in the state of ON of a sensor 21, in response, a motor 18 drives and an intermittent revolution of the separation plate 9 is resumed. Thus, it can **** to through hole 9b which arrived at the ejection location one by one, and can check whether 2 is held or not, and separation supply of the screw thread 2 can be carried out.

[0023] In separation supply actuation of the above-mentioned screw thread 2, since the vacuum pressure within the path from free passage hole 10b to a vacuum switch 12 increases and a vacuum switch 12 is turned on also when the part by which through hole 9b is not formed during the intermittent revolution of the separation plate 9 passes through a free passage hole 10b top, there is a possibility that equipment may malfunction by this. However, in this separation feeder 1, since the signal of a vacuum switch 12 and the sensor 21 which detects the time of the completion of an intermittent revolution is seen as mentioned above, malfunction by the ON signal of the vacuum switch 12 in case there is no through hole 9b in an ejection location can be prevented.

[0024] If a screw thread 2 follows on being taken out and the screw thread 2 in the bucket section 6 decreases, the photoelectrical sensor 25 will detect this. A buzzer, a warning lamp, etc. operate in response to the signal of this

photoelectrical sensor 25, and makeup of a screw thread is demanded from an operator. Since it is possible to make the photoelectrical sensor 25 leave from the bucket section 6 by making the sensor mounting plate 22 rock on the occasion of makeup of this screw thread 2, it ****s without being interfered by the sensor mounting plate 22 and photoelectrical sensor 25 grade, and makeup of 2 is possible. Moreover, if the screw thread 24 which stops a lock plate 23 is loosened a little, the slide shafts 26 and 26 are opened and this is moved to shaft orientations, the location of the photoelectrical sensor 25 can be changed. Thus, it becomes possible to set up variously the timing which ****s to the bucket section 6 and stimulates makeup of 2 by enabling it to move the photoelectrical sensor 25 horizontally to the slideway of the screw thread with which the bucket section 6 inclined.

[0025] In addition, in the gestalt of operation of this invention, although the example which carries out separation supply of the minute screw thread 2 was explained, even when the separation feeder concerning this invention can perform separation supply of various bars with the head, such as rivets other than a screw thread, a pin with the head, and a nail, and it performs separation supply of bars with the head other than these screw threads, the effectiveness acquired is the same.

[0026]

[Effect of the Invention] According to the separation feeder of the bar with the head concerning this invention, the bar with the head located near the boundary part of a separation plate and the bucket section by churning members, such as a churning plate, can be agitated. Therefore, even if the bar with the head of bucket circles runs short, a bar with the head can be agitated, and it can prevent that the bar with the head which ran short is piled up in accordance with a bucket section wall, and a bar with the head can always be gathered in the location near the separation plate. For this reason, there is an advantage of being able to perform residue detection by residue detection means, such as a photoelectrical sensor, to accuracy. Moreover, since a residue detection means is constituted so

that detection distance can be set as arbitration while it is constituted so that it may move to the location of the arbitration on the inclining bucket section wall and can position, it has the advantage of being able to set up broadly the timing which emits the makeup command of a bar with the head. Furthermore, since the residue detection means is arranged rockable so that it can leave from a bucket section wall, it also has the advantage of being able to do smoothly the makeup activity of the bar with the head to the bucket section.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the elements on larger scale near the separation plate at the time of seeing from the direction which carries out the right pair of the separation feeder of the bar with the head concerning this invention to a separation plate.

[Drawing 2] the A-A line of drawing 3 is started -- it is a notching sectional view a part.

[Drawing 3] It is the top view of the separation feeder of the bar with the head concerning this invention.

[Drawing 4] It is the elements on larger scale at the time of removing the

separation plate in the separation feeder of the bar with the head concerning this invention, and a churning plate, and seeing drawing 1 and from said.

[Drawing 5] It is an important section expanded sectional view concerning the B-B line of drawing 2 .

[Drawing 6] It is the important section expanded sectional view of the separation feeder of the bar with the head concerning this invention.

[Drawing 7] It is the explanatory view of the separation feeder of the conventional bar with the head.

[Description of Notations]

1 Separation Feeder of Bar with Head

3 Hopper Area

5 Plinth Section

5a Attraction hole

5b Attraction hole

6 Bucket Section

9 Separation Plate

9b Through hole

9c Churning pin

10 Ring Plate

10a Free passage hole

10b Free passage hole

11 Attraction Hose

12 Vacuum Switch

13 Revolution Transfer Gear

14 Positioning Cam

15 Deduction Gear

16 Deduction Cam

18 Synchronous Motor

20 Dog

21 Sensor

22 Sensor Mounting Plate

25 Photoelectrical Sensor

26 Slide Shaft

27 Churning Plate

[Translation done.]

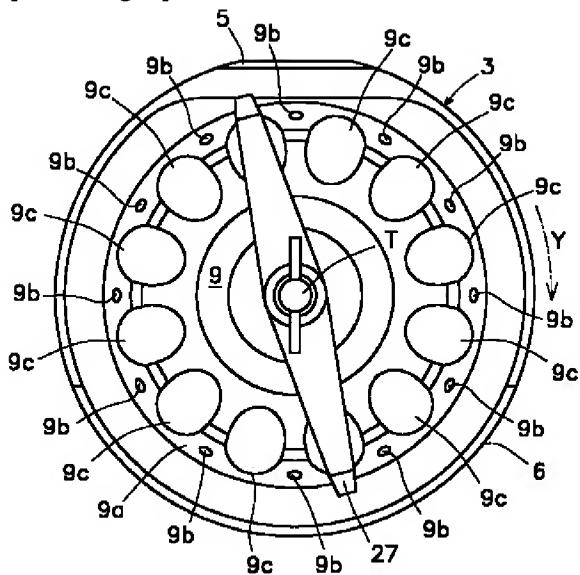
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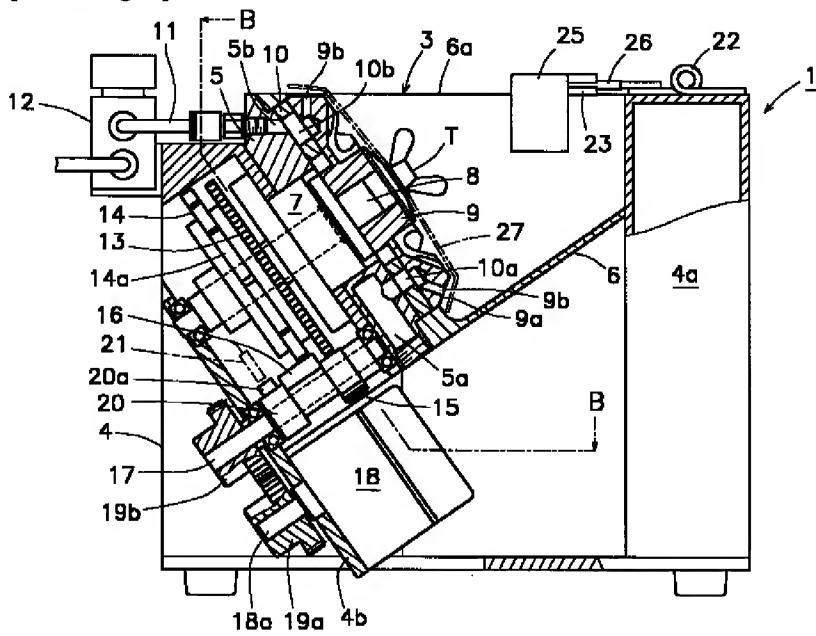
DRAWINGS

[Drawing 1]

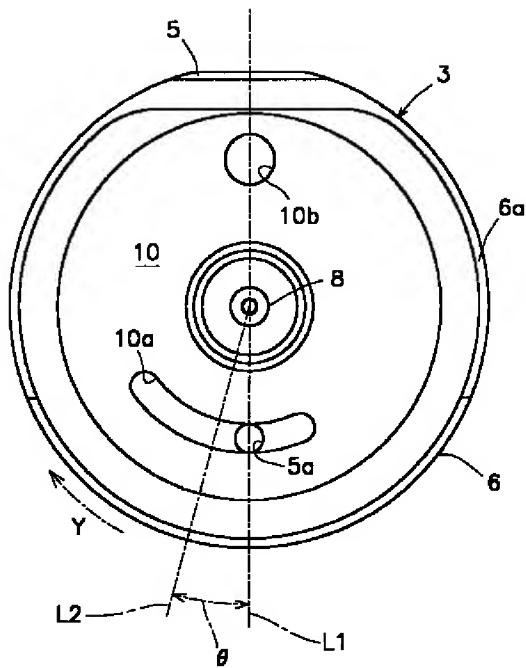


3 ホッパ部
9 分離プレート
9b 真通穴
27 搅拌プレート

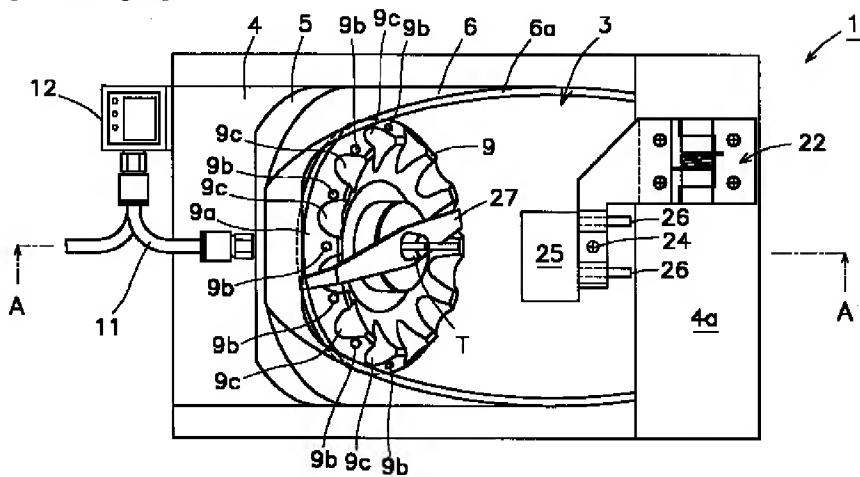
[Drawing 2]



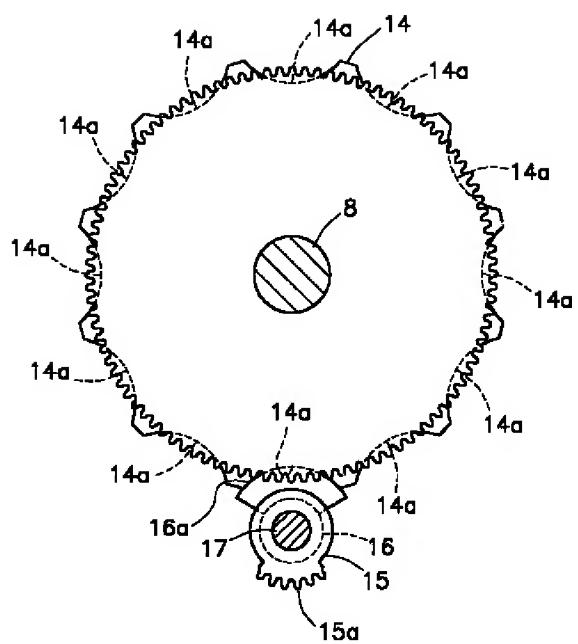
[Drawing 4]



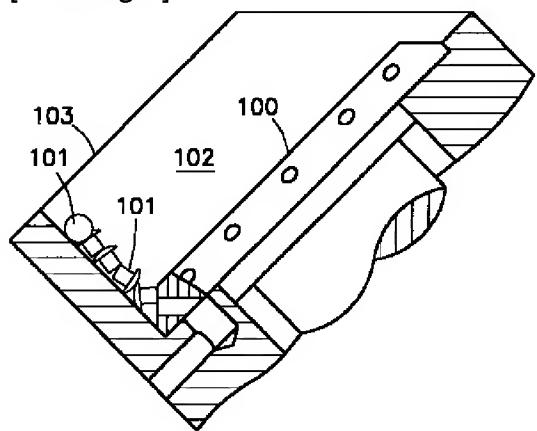
[Drawing 3]



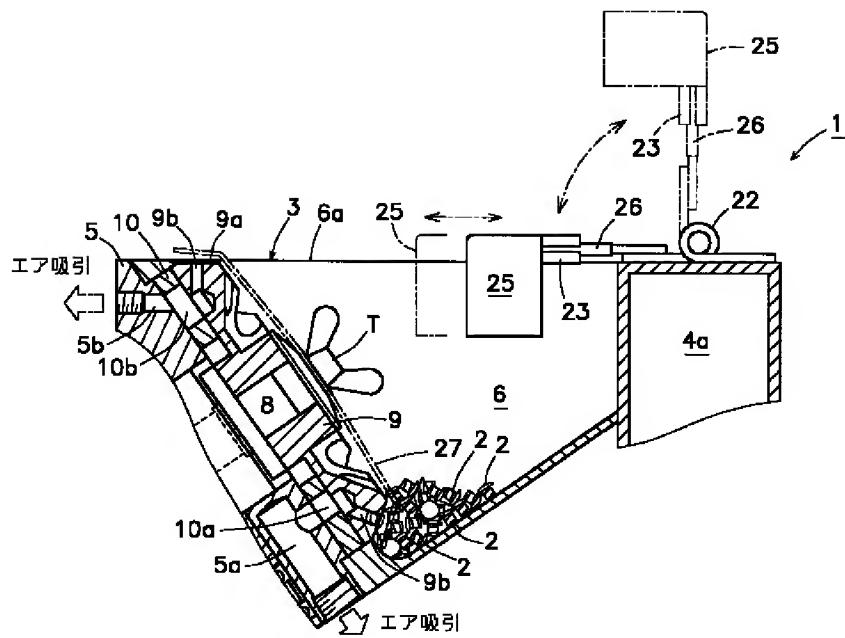
[Drawing 5]



[Drawing 7]



[Drawing 6]



[Translation done.]

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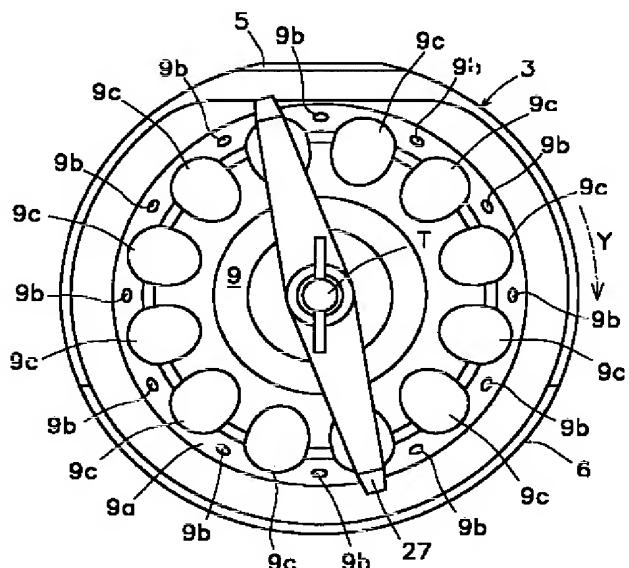
F ターム(参考) 3F080 AA24 BA01 BF04 BF11 BF26
CC04 CC10 CC14 CC94 CG15
DA18 DB05 EA09 EA10 FB05

(54)【発明の名称】 頭付き棒材の分離供給装置

(57)【要約】

【課題】頭付き棒材の残量検出を正確に行うことができる頭付き棒材の分離供給装置の提供。

【解決手段】本発明は、多数の頭付き棒材を貯留可能なホッパ部3と、このホッパ部3の底部に水平から所定角度傾斜させて回転自在に設けられかつ外周部分に頭付き棒材が嵌合可能な貫通穴9bが複数等分配置された分離プレート9と、この分離プレート9の貫通穴9bからエアを吸引するエア吸引部とを備えている。また、分離プレート9には、これと一体に回転する搅拌プレート27が取り付けられており、これにより前記ホッパ部3と分離プレート9の境界部分に位置する頭付き棒材を残り少なくなっても搅拌し、光電センサ等による残量検出を正確なせるように構成されている。



3 ホッパ部
9 分離プレート
9b 貫通穴
27 搅拌プレート

【特許請求の範囲】

【請求項1】多数の頭付き棒材を貯留可能なホッパ部と、このホッパ部の底部に水平から所定角度傾斜させて回転自在に設けられかつ外周部分に頭付き棒材が嵌合可能な貫通穴が複数等分配置された分離プレートと、この分離プレートの貫通穴からエアを吸引するエア吸引部とを備えた頭付き棒材の分離供給装置であって、ホッパ部と分離プレートの境界部分に位置する頭付き棒材を搅拌可能な搅拌部材を設けたことを特徴とする頭付き棒材の分離供給装置。

【請求項2】ホッパ部内の頭付き棒材の残量を検出可能な残量検出手段を有していることを特徴とする請求項1に記載の頭付き棒材の分離供給装置。

【請求項3】残量検出手段は、ホッパ部に貯留される頭付き棒材上方の任意の位置に移動して位置決め可能かつ頭付き棒材を検出する距離を任意に設定できるように構成されていることを特徴とする請求項2に記載の頭付き棒材の分離供給装置。

【請求項4】残量検出手段は、頭付き棒材を検出可能な定常位置から退去可能に構成されていることを特徴とする請求項2または請求項3に記載の頭付き棒材の分離供給装置。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】本発明は、給送ホースを使ったエア給送が困難な微小なねじ等の頭付き棒材を分離供給する頭付き棒材の分離供給装置に関する。

【0002】

【従来の技術】従来、ねじ等の頭付き棒材を自動ねじ締め機などの作業装置に供給する場合には、フィーダと作業装置とを給送ホースで連絡し、この給送ホースを利用してフィーダで分離供給されたねじを圧縮エアで給送する方式が採用されてきた。しかし、頭部径に対して脚部長の短い短寸頭付き棒材及び携帯機器、カメラなどの精密機器に使用される微小ねじ等の微小頭付き棒材については、給送ホース内で反転することが多く、エア給送が非常に難しいため、これに対応して特開平5-58433号公報に開示される頭付き棒材分離供給装置（以下、単に分離供給装置という）が提供されるに至っている。

【0003】前記特開平5-58433号公報に示される分離供給装置は、頭付き棒材を多数貯留可能なホッパと、このホッパ内に水平から所定角度傾斜して回転自在に設けられかつ外周部に頭付き棒材が嵌合可能な貫通穴が複数等分配置された分離プレートと、この分離プレートの貫通穴からエアを吸引して貫通穴に頭付き棒材を吸引するエア吸引部と、前記分離プレートを前記貫通穴のピッチ毎間欠回転させるための回転駆動源たるパルスモータとを有している。この分離供給装置では、パルスモータの駆動を受けて分離プレートが間欠回転し、これにより貫通穴が順次所定の取り出し位置に回転移動して一

時停止する。取り出し位置には、貫通穴にねじが保持されているか否かを検出するセンサが設けられており、このセンサにより貫通穴にねじがあることが検出されると、自動ねじ締め機等が作動して取り出し位置にある貫通穴からねじを取り出すようになっている。

【0004】

【発明が解決しようとする課題】しかし、上記従来の分離供給装置等においては、分離プレートの回転面が水平面に近ければ近いほど、分離プレートの回転にともなってホッパに貯留されたねじが分離プレート上に拡散してしまう。このため、分離プレートは、回転面ができるだけ鉛直面に近づくように配置するのが好ましい。これを特開平5-58433号の分離供給装置に当てはめた場合、分離プレートを傾斜させると、これに応じてホッパの傾斜が緩やかになってしまふ。この結果、ホッパの頭付き棒材の貯留量が少なくなると、図7に示すように、分離プレート100に当たった頭付き棒材101が他の頭付き棒材101を押す関係で、頭付き棒材101がホッパ102の開口部103側に移動し、ホッパ102の内周面に拡散してしまう。故に、センサ（図示せず）によりホッパ102内の頭付き棒材101の残量検出を行うと、頭付き棒材101が極めて少なくなっているにもかかわらず、センサが頭付き棒材101を検出し続け、補給指令が発せられない等の問題が発生していた。

【0005】

【課題を解決するための手段】本発明は、上記課題に鑑みて創成されたものであり、多数の頭付き棒材を貯留可能なホッパ部と、このホッパ部の底部に水平から所定角度傾斜させて回転自在に設けられかつ外周部分に頭付き棒材が嵌合可能な貫通穴が複数等分配置された分離プレートと、この分離プレートの貫通穴からエアを吸引するエア吸引部とを備えた頭付き棒材の分離供給装置であって、ホッパ部と分離プレートの境界部分に位置する頭付き棒材を搅拌可能な搅拌部材を設けたことを特徴とするものである。

【0006】なお、前述の構成においては、ホッパ部内の頭付き棒材の残量を検出可能な残量検出手段を有していることが好ましく、この場合、残量検出手段は、ホッパ部に貯留される頭付き棒材上方の任意の位置に移動して位置決め可能かつ頭付き棒材を検出する距離を任意に設定できるように構成されているがより好ましい。また、前記残量検出手段は、頭付き棒材を検出可能な定常位置から退去可能に構成されていることが好ましい。

【0007】

【発明の実施の形態】以下、本発明の実施の形態を図1乃至図6に基づいて説明する。図1乃至図6において、1は頭付き棒材の分離供給装置（以下、分離供給装置1という）であり、エア給送が困難な頭付き棒材の一例である微小なねじ2を多数貯留可能なホッパ部3を備えている。このホッパ部3は、ベース4に取り付けられた台

座部5と、この台座部5に所定角度傾斜して取り付けられた円筒状のバケット部6とから構成されている。このバケット部6の上部開口端面は水平面6aになるように形成してあり、これにより開口部の面積を大きくしてねじを投入し易く、また、バケット部6内を視認し易くしてある。

【0008】前記バケット部6の前方には、ブラケット4aが配置されており、このブラケット4aには、蝶番構造で揺動可能に構成されたセンサ取付プレート22が取り付けられている。このセンサ取付プレート22の先端部には、ロックプレート23がねじ24によりねじ止めされており、このロックプレート23により、残量検出手段の一例である光電センサ25が固定されたスライド軸26, 26を挟持するようになっている。このスライド軸26, 26に支持された光電センサ25は、バケット部6内に貯留されるねじ2の量を検出可能に構成されているものであり、その検出距離、すなわち感度を任意に設定できるように構成されている。

【0009】また、前記ホッパ部3の台座部5には、軸受部7によって回転自在に支持された主軸8が挿通しており、この主軸8の一端には台座部5の上面側、すなわちホッパ部3の底部にあたる位置に配置された分離プレート9が一体に回転するよう連結されている。この分離プレート9と台座部5との間には、台座部5に固定された樹脂製のリングプレート10が介在しており、後述のエア吸引の機密性を高め得るようになっている。また、分離プレート9には、後記貫通穴9bを遮ることなく分離プレート9の直径方向に延びて搅拌部材の一例である搅拌プレート27が取り付けである。この搅拌プレート27は、分離プレート9の表面に沿う形状を成しており、分離プレート9の表面と所定の隙間を置き、分離プレート9とバケット部6との境界近傍まで延びるように取り付けられている。これら分離プレート9、搅拌プレート27は、主軸8に蝶ボルトTにより共締めしており、分離プレート9、搅拌プレート27は簡単に取り外して交換できる。

【0010】前記分離プレート9は、円周部分に面取り部9aが施された円盤形状を成しており、その円周部分には、前記面取り部9aに対して直行する方向に延びて分離プレート9を貫通する貫通穴9bと、搅拌用凹部9c（以下、単に凹部9cという）とが、分離プレート9の回転中心回り、つまり前記主軸8の軸心回り、に交互に複数、所定ピッチで等分配置されている。各貫通穴9b・・・は、ねじの脚部（ねじ部）が挿通可能かつ頭部が進入不可能な径にしてあり、分離プレート9の回転とともにあって最高位置に移動した時、鉛直方向に向くようになっている。つまり、面取り部9aの角度がそのように設定されているのである。本分離供給装置1では、この分離プレート9の最高位置がねじの取り出し位置に設定されている。

【0011】前記台座部5における分離プレート9の下部に相当する箇所には、エア吸引装置（図示せず）から延びる吸引ホース（図示せず）を接続可能な吸引穴5aが形成されており、この吸引穴5aと分離プレート9の所定の貫通穴9bとを連通させるよう、前記リングプレート10には連通穴10aが形成されている。この連通穴10aは、図4に示すように、分離プレートの上下中心線L1に対して矢印Yで示す分離プレート9の回転方向に所定角度θ傾斜した傾斜中心線L2に線対称な円弧形状に構成されており、この連通穴10aに連通する所定の貫通穴9b・・・からエア吸引が行えるように構成されている。つまり、この分離供給装置1では前記吸引穴5a、連通穴10a、吸引ホース及びエア吸引装置等によって特許請求の範囲に記載のエア吸引部が形成されているのである。

【0012】また、台座部5における分離プレート9のねじ取り出し位置（最高位）に相当する箇所には、エア吸引装置（図示せず）から延びる前述の吸引ホースとは別の吸引ホース11が接続された吸引穴5bが形成されており、前記リングプレート10には、取り出し位置の貫通穴9bと吸引穴5bとを連通させる連通穴10bが形成されている。さらに、吸引穴5bに接続される吸引ホース11上には真空スイッチ12が設けられており、分離プレート9の貫通穴9bから連通穴10b、吸引穴5b、吸引ホース11を経由して真空スイッチ12に至るエア吸引経路内の圧力変化を検出し、ここのエア挿通状態を確認できるように構成されている。

【0013】一方、前記主軸8の他端部には、回転伝達ギア13および位置決めカム14が一体に回転するよう取り付けられており、主軸8の他端は、ベース4下部に取り付けられたブラケット4bに回転自在に支持されている。

【0014】図5に示すように、前記回転伝達ギア13は、円周部に所定数の歯が形成された歯車であり、この回転伝達ギア13には、割出ギア15が間欠噛合するように構成されている。また、前記位置決めカム14は、円板の円周部に所定半径の円弧状切欠14a・・・を複数連設したスプロケット形状のカム部材であり、この位置決めカム14には、割出カム16が間欠的に係合するように構成されている。

【0015】前記割出ギア15及び割出カム16は、主軸8と平行に延びて回転自在に配置された駆動軸17に固定されており、この駆動軸17の回転にともなって一体に回転するよう構成されている。割出ギア15は、円周部の所定範囲にだけ前記回転伝達ギア13の歯と噛合可能な歯部15aが形成された特殊形状の歯車であり、歯部15a以外の周部分は、回転伝達ギア13に干渉しないように削設されている（図5参照）。回転伝達ギア13は、この割出ギア15が1回転する間に割出ギア15の歯部15aと噛合している間だけ回転し、これ

を受けて前記分離プレート9は貫通穴9bの1ピッチ分間欠回転する。つまり、割出ギア15の歯部15aの形成範囲は、分離プレート9の貫通穴9bのピッチに合わせて設計されている。なお、割出ギア15は分離プレート9の貫通穴9bが間欠回転毎に順次取り出し位置に停止するタイミングで回転伝達ギア13と噛合関係を持つよう、その取り付け位置が調整してある。

【0016】また、前記割出カム16は、前記位置決めカム14の円弧状切欠14aと同じ半径の係合円周部16aを部分的に有し、この係合円周部16a以外の部分は、前記位置決めカム14に干渉しない径に構成されている(図5参照)。この割出カム16は、前記割出ギア15が回転伝達ギア13に噛合し始める時に係合円周部16aが位置決めカム14の円弧状切欠14aから離れ、割出ギア15と回転伝達ギア13との噛合が解かれる時に係合円周部16aが円弧状切欠14aに沿って係合するよう、割出ギア15等との位置関係が調整されている。

【0017】前記駆動軸17は、ブレケット4bに取り付けられたシンクロナスマータ18(以下、単にモータ18という)の出力軸18aと伝達ギア19a, 19bを介して連結されており、当該モータ18の駆動を受けて回転するように構成されている。また、駆動軸17には、駆動軸17の周方向に突出する突起部20aを1箇所設けたドグ20が取り付けられており、このドグ20の突起部20aを検出できるよう、前記ベース4にはセンサ21が設けられている。このセンサ21とドグ20は、前記割出ギア15と回転伝達ギア13との作用により分離プレート9が間欠回転し終わった時にセンサ21がドグ20の突起部20aを検出してオンするよう、双方の取り付け位置が調整されている。

【0018】前述の構造で成る分離供給装置において、モータ18が駆動すると駆動軸17が回転し、割出ギア15、割出カム16及びドグ20が一体に回転する。割出ギア15の回転にともなって回転伝達ギア13には間欠的に回転が伝達され、これにより分離プレート9がホッパ部3に対して矢印Y方向に間欠回転する。この時、回転伝達ギア13と割出ギア15の噛合が解かれる時点(分離プレート9、主軸8等が停止する時点)において、位置決めカム14の円弧状切欠14aには割出カム16の係合円周部16aが係合するため、回転伝達ギア13、主軸8、分離プレート9をその場で正確に位置決めすることができる。つまり、回転伝達ギア13と割出ギア15との噛合が解かれた時に、回転伝達ギア13、主軸8、分離プレート9等が回転フリーになることを防ぎ、回転伝達ギア13の位置ずれによる割出ギア15と回転伝達ギア13の再噛合時の噛み込み、分離プレート9の間欠停止位置のずれなどを防ぐことができる。また、装置の電源が切られた場合にも、前述の作用に加えてモータ固有の減速比による回転負荷が作用するため、

分離プレートが勝手に回転して間欠停止位置がずれてしまうこともない。このように、分離プレート9の間欠回転における位置割出精度は常に高精度に維持されるのである。

【0019】分離プレート9が間欠回転している状態で、エア吸引装置の作動により吸引穴5aからエアの吸引が開始されると、ホッパ部3に貯留されたねじ2は、分離プレート9の貫通穴9bに吸引保持されて取り出し位置に移送される。この時、ホッパ部3内のねじ2...は、分離プレート9の凹部9cによって搅拌されるため、貫通穴9bへ吸引保持される確率が極めて高くなる。しかも、凹部9c...は、曲面で成るため、これによる搅拌時にねじ2...が損傷する事がない。また、ねじ2は、搅拌プレート27によっても定期的に搅拌されるため、バケット部6に貯留されたねじ2...の集まりを均し、センサによる残量検出を正確ならしめることができる。この搅拌プレート27の搅拌作用は、搅拌プレート27が分離プレート9とバケット部6との境界部分近傍まで延びていることから、バケット部6内のねじ2が少なくとも継続される。このように分離プレート9とバケット部6との境界部分のねじ2が搅拌され続けることで、ねじ2がバケット部6の壁面に沿って積み重なるのを防止し、万一積み重なっても、これを崩すことができる。よって、光電センサ25によるねじの残量検出を正確に行うことができる。

【0020】また、分離プレート9の間欠回転にともない、ホッパ部3内のねじ2...は分離プレート9との摩擦、凹部9c...による搅拌作用等により分離プレート9の回転方向(矢印Y方向)に偏って分布する。これに対し、連通穴10aは、傾斜中心線L2に対して対称な形、つまり、分離プレート9の回転方向にオフセットして延びる形、に配置されているため、ホッパ部3内のねじ2...が分離プレート9の回転方向に偏っても、これらのねじ2...を貫通穴9bに効率よく吸引保持することができる。

【0021】一方、分離プレート9の最高位置に相当する取り出し位置では吸引穴5bからエアの吸引が行われており、ここに連通した貫通穴9bにねじが保持されている場合には、貫通穴5bから連通穴10b、吸引穴5b、吸引ホース11を経由して真空スイッチ12に至る経路内の圧力が上昇し、これにより真空スイッチ12がオンする。同時に貫通穴9bが取り出し位置に達した時にはセンサ21がオンになるため、このセンサ21がオンになっていて、なおかつ真空スイッチ12がオンになっている場合には、取り出し位置にある貫通穴9bにねじ2が保持されていると見なしてモータ18が一時停止する。

【0022】その後、取り出し位置にある貫通穴9bのねじ2がねじ締め機等の作用によって取り出されると、センサ21がオンの状態で真空スイッチ12がオフにな

るため、これを受けてモータ18が駆動し、分離プレート9の間欠回転を再開する。このようにして順次取り出し位置に達した貫通穴9bにねじ2が保持されているか否かを確認し、ねじ2を分離供給することができる。

【0023】前述のねじ2の分離供給動作において、分離プレート9の間欠回転中に貫通穴9bの形成されていない部分が連通穴10b上を通過する時にも、連通穴10bから真空スイッチ12に至る経路内の真空圧が高まって真空スイッチ12がオンになるため、これにより装置が誤動作する恐れがある。しかし、本分離供給装置1では、前述のように真空スイッチ12と間欠回転完了時を検出するセンサ21との信号を見ているため、取り出し位置に貫通穴9bがない場合の真空スイッチ12のオン信号による誤動作を防止することができる。

【0024】ねじ2が取り出されていくにともない、バケット部6中のねじ2が少なくなると、これを光電センサ25が検出する。この光電センサ25の信号を受けてブザー、警告ランプ等が作動し、作業者にねじの補給を促す。このねじ2の補給に際しては、センサ取付プレート22を揺動させることで光電センサ25をバケット部6から退去させることができるのであるため、センサ取付プレート22、光電センサ25等に邪魔されることなくねじ2の補給が可能である。また、ロックプレート23を止めるねじ24を少し緩めてスライド軸26、26を開放し、これを軸方向に移動させれば、光電センサ25の位置を変更することができる。このように、バケット部6の傾斜したねじの案内面に対し、水平方向に光電センサ25を移動できるようにすることで、バケット部6へねじ2の補給を促すタイミングを様々に設定することができる。

【0025】なお、本発明の実施の形態においては、微小なねじ2を分離供給する例について説明したが、本発明に係る分離供給装置は、ねじ以外のリベット、頭付きピン、釘等の各種頭付き棒材の分離供給を行うことができるものであり、これらねじ以外の頭付き棒材の分離供給を行う場合でも、得られる効果は同じである。

【0026】

【発明の効果】本発明に係る頭付き棒材の分離供給装置によれば、搅拌プレート等の搅拌部材で分離プレートとバケット部との境界部分近傍に位置する頭付き棒材を搅拌することができる。従って、バケット部内の頭付き棒材が残り少なくなっても頭付き棒材を搅拌することができ、残り少なくなった頭付き棒材がバケット部内壁に沿って積み重なることを防止し、常に分離プレート近傍位置に頭付き棒材を集合させておくことができる。このため、光電センサ等の残量検出手段による残量検出を正確に行うことができる等の利点がある。また、残量検出手段は、傾斜するバケット部内壁上の任意の位置に移動し

位置決めできるように構成されるとともに、検出距離を任意に設定できるように構成されているため、頭付き棒材の補給指令を発するタイミングを幅広く設定することができる等の利点がある。さらに、残量検出手段は、バケット部内壁上から退去できるよう揺動可能に配置されているため、バケット部への頭付き棒材の補給作業を円滑に行うことができる等の利点もある。

【図面の簡単な説明】

【図1】本発明に係る頭付き棒材の分離供給装置を分離プレートに正対する方向から見た場合の分離プレート付近の部分拡大図である。

【図2】図3のA-A線に係る一部切欠断面図である。

【図3】本発明に係る頭付き棒材の分離供給装置の平面図である。

【図4】本発明に係る頭付き棒材の分離供給装置における分離プレート、搅拌プレートを取り外し、図1と同方向から見た場合の部分拡大図である。

【図5】図2のB-B線に係る要部拡大断面図である。

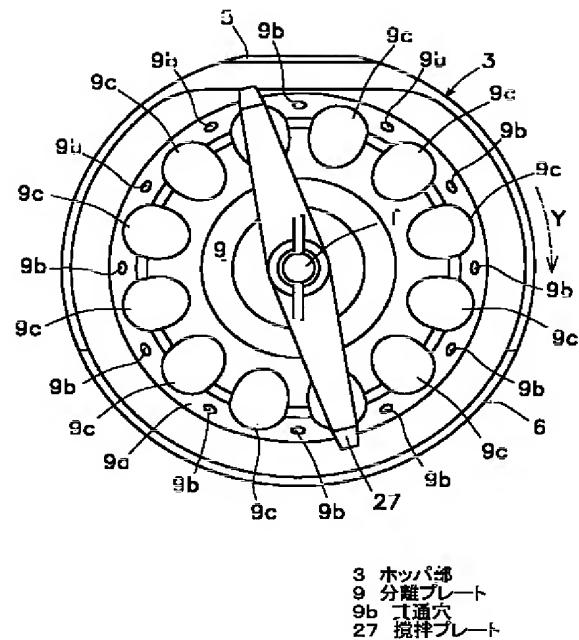
【図6】本発明に係る頭付き棒材の分離供給装置の要部拡大断面図である。

【図7】従来の頭付き棒材の分離供給装置の説明図である。

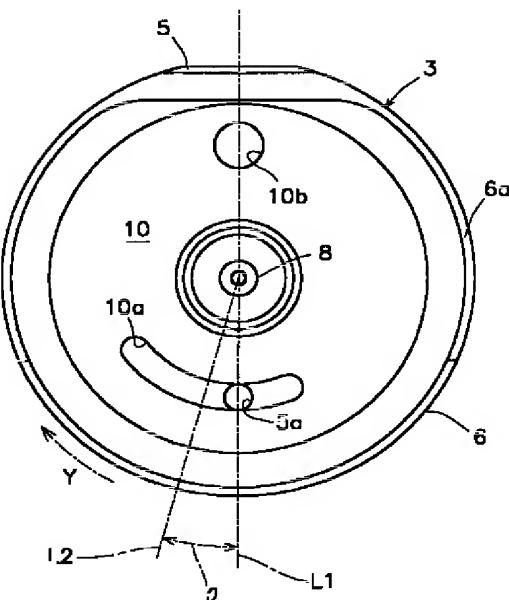
【符号の説明】

- 1 頭付き棒材の分離供給装置
- 3 ホッパ部
- 5 台座部
- 5a 吸引穴
- 5b 吸引穴
- 6 バケット部
- 9 分離プレート
- 9b 貫通穴
- 9c 搅拌ピン
- 10 リングプレート
- 10a 連通穴
- 10b 連通穴
- 11 吸引ホース
- 12 真空スイッチ
- 13 回転伝達ギア
- 14 位置決めカム
- 15 割出ギア
- 16 割出カム
- 18 シンクロナスモータ
- 20 ドグ
- 21 センサ
- 22 センサ取付プレート
- 25 光電センサ
- 26 スライド軸
- 27 搅拌プレート

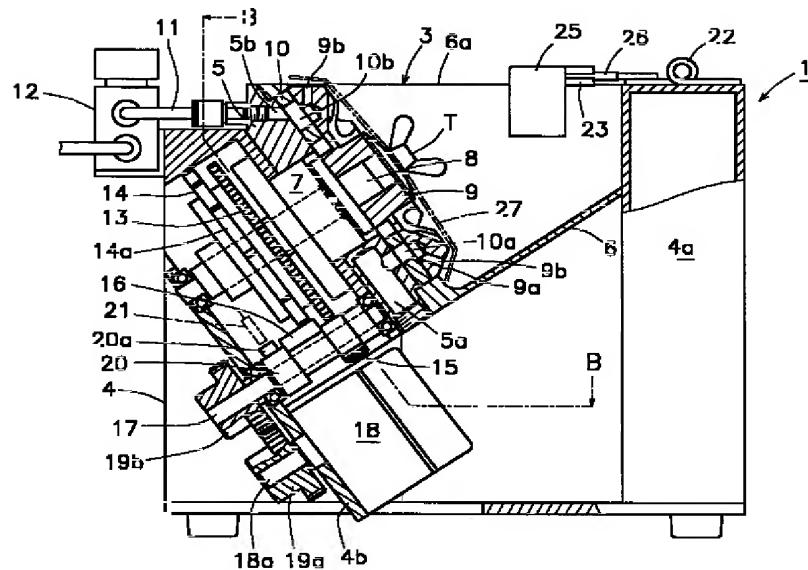
【図1】



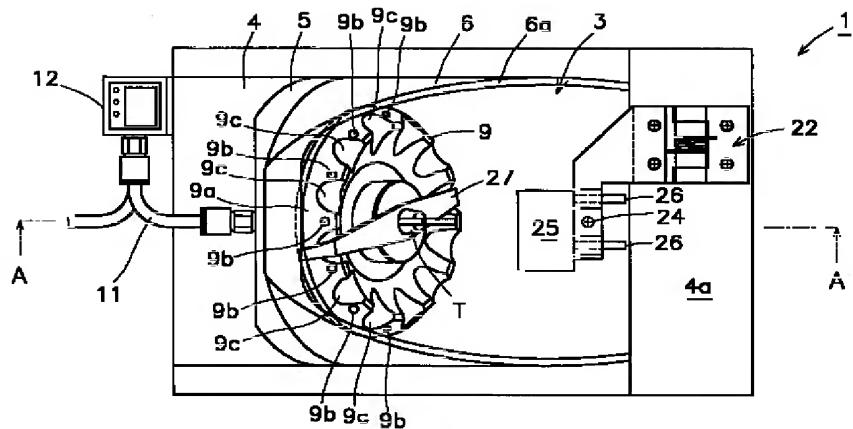
【図4】



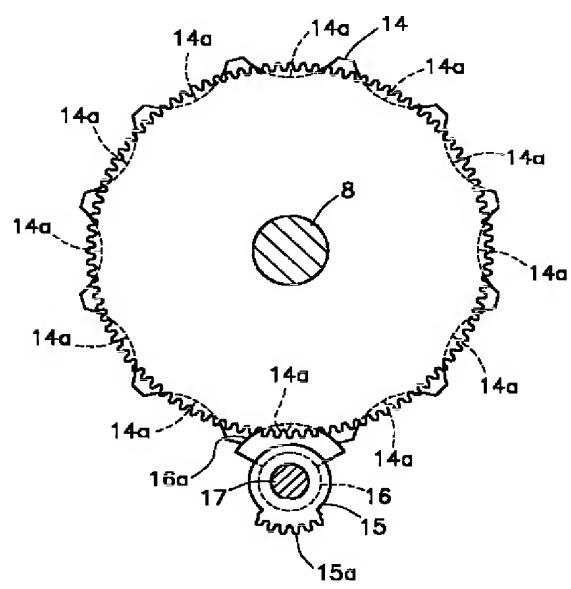
【図2】



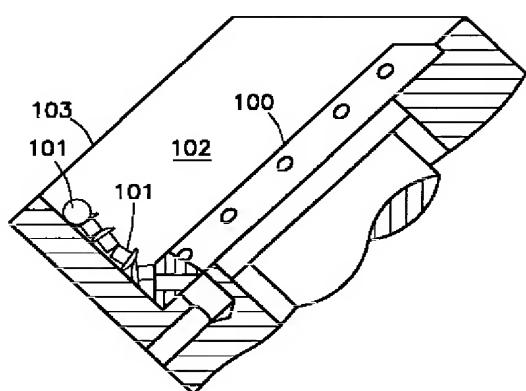
【図3】



【図5】



【図7】



【図6】

